

ATOMS FOR PEACE AFTER 50 YEARS
CGSR Civilian Applications: What Advances are in Store for Nuclear Medicine
Reported by Dr. G. C. Lowenthal

Nuclear techniques applied to medicine, both, clinical and instrumental, gained steadily in effectiveness thanks to research and applications carried out among others at the Royal Prince Alfred Hospital (RPAH) Department of PET and Nuclear Medicine, associated with the University of Sydney (Director: Associate Professor M.J. Fulham FRACP) The RPAH remains one of the leaders in this particularly valuable application of the nuclear sciences, an important addition to nuclear power. There are now at the RPAH extensive radio-chemistry facilities as well as recently designed gamma ray cameras and, since the early 1990s, Positron Emission Tomography (PET) and associated techniques.

This report contains a few comments on two research projects carried out among many others at the RPAH Department of PET and Nuclear Medicine and likely to be of interest to the CGSR Workshop

(1): Improving the effectiveness of the action of drugs, especially newly developed therapeutic drugs. Their movements in the body of a patient are followed using a PET camera to image a cyclotron produced tracer, carbon-11($T_{1/2} \sim 20$ m), used to replace carbon-12.

(2): Improvements in the effectiveness of respiratory medicine using radio labeled tracers to verify treatments of chronic respiratory diseases, notably asthma and bronchial disorders.

The information under (1) was obtained from a paper by Dr. M. Kassiou in the Department of PET and Nuclear Medicine of the Royal Prince Alfred Hospital, e-mail: mkassiou@med.usyd.edu.au .

The information under (2) was obtained from Senior Research Scientist Dr. Evangelia Daviskas, Department of Respiratory Medicine, Royal Prince Alfred Hospital, e-mail: daviskas@mail.med.usyd.edu.au .

(1): Drugs are synthesised with carefully developed radio tracers based on carbon-11 and used in conjunction with mathematical models and PET camera imaging. For the projects here under discussion, the radio-nuclide tracers are applied to newly developed drugs as just obtained from the manufacturer. The tracers are being designed not to interfere with the biochemical or pharmaceutical effectiveness of the drugs.

There are several biologic molecules implicated in diseases such as Parkinson's disease and schizophrenia, against which anti-psychotic drugs are at present very rarely effective. Several new drugs have become available and RPAH research is developing radio pharmaceuticals based on carbon-11 to help with identifying those drugs which will produce maximum patient benefit with minimal side effects. These investigations are examples of pharmaco-dynamic studies leading to the synthesis of effective therapeutic drugs.

(2): Researches in respiratory medicine aim to achieve more effective measurements of the rates of deposition and also the clearance of radio-labeled therapeutic compounds using a state-of-the-art gamma camera. Important objectives of these researches are, among others, to assess the pharmacological impact of new therapies as well as physical improvements in patients.